

Modelling the Effects of Surface Residual Stresses on Fatigue Behavior of PM Disk Alloys, Phase I

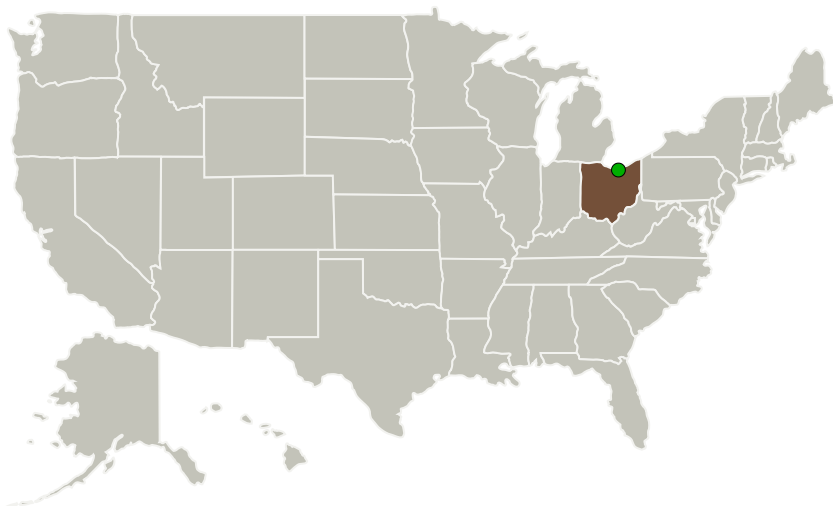
Completed Technology Project (2011 - 2011)



Project Introduction

A finite element based model will be developed and validated to capture the evolution of residual stresses and cold work at machined features of compressor and turbine powder metallurgy superalloy disks. The focus will be to quantify, model and validate residual stress and cold work evolution at stress concentration features during simulated service in aerospace gas turbine engine disk materials. This will be accomplished by first utilizing existing NASA Test data. If the existing test data are insufficient, a minimum number of specimens will be tested if the resources permit. These specimens will have varied surface finish conditions to be determined in consultation with NASA personnel and will be tested using a thermal mechanical load history that will simulate the operating conditions of new generation of gas turbine engines and include the effect of superimposed dwell cycles. The deliverables will include effects of service history on residual stress and cold work depth profile evolutions within notches, and analytical modeling descriptions of the evolution of these parameters as a function of simulated service history. Also included will be models and algorithms extrapolating the predicted residual stresses and cold work to service conditions outside of those tested during the program.

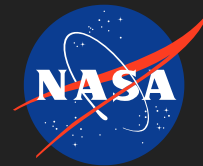
Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3



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Organizations Performing Work	Role	Type	Location
N&R Engineering	Lead Organization	Industry Small Disadvantaged Business (SDB)	Parma Heights, Ohio
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Ohio

Project Transitions



February 2011: Project Start



September 2011: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138321>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

N&R Engineering

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Kathy Paulitzky

Co-Investigator:

John Gayda

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Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.2 Observatories
 - └ TX08.2.1 Mirror Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System